CLAIMS

What is claimed is:

1. A method of organizing a plurality of connections in an optical network into one or more spectral groups, wherein there is a maximum number of available spectral groups, and wherein the spectral groups have a maximum capacity of connections and subconnections that can be carried in a single spectral group, comprising:

routing each connection from a source to a destination;

partitioning each of at least one connection into a plurality of subconnections; and

forming spectral groups for connections and subconnections that are routed on identical paths.

2. The method of claim 1, further comprising after forming a spectral group:

determining whether any of the spectral groups exceed the maximum capacity of the spectral groups;

converting spectral groups that exceed the maximum capacity of the spectral groups into two or more spectral groups that do not exceed the maximum capacity of the spectral groups.

3. The method of claim 1, further comprising after converting spectral groups:

determining whether the number of spectral groups exceeds the maximum number of available spectral groups;

combining spectral groups when the number of spectral groups exceeds the maximum number of available spectral groups, wherein combining includes adding the connections and/or subconnections from at least two spectral groups into a combined spectral group, so that the combined spectral group includes connections and/or subconnections that are not routed on identical paths.

4. The method of claim 3, wherein combining spectral groups includes performing at least one of subsetting operations, merging operations, and branching operations.

5. The method of claim 4, wherein the spectral groups each include at least one connection or subconnection and wherein the spectral groups have a maximum capacity of connections and subconnections that can be carried in a single spectral group, and wherein combining spectral groups includes:

determining a minimum fill rate for a combined spectral group;

determining whether a first spectral group can be combined with a second spectral group according to predetermined criteria, wherein the criteria includes:

the first spectral group is a sub-set of the second spectral group;

a fill rate of the combined spectral group is at least equal to the minimum fill rate;

the combined spectral group includes a total number of connections and subconnections that are equal to or less than the maximum capacity for a single spectral group; and

combining spectral groups that satisfy the predetermined criteria.

6. The method of claim 4, wherein the spectral groups each include at least one connection and/or subconnection and wherein the spectral groups have a maximum capacity of connections and subconnections that can be carried in a single spectral group, and wherein combining spectral groups includes:

determining a minimum fill rate for a combined spectral group;

determining whether a first spectral group can be combined with a second spectral group according to predetermined criteria, wherein the criteria includes:

the first and second spectral groups overlaps at opposite ends;

a fill rate of the combined spectral group is at least equal to the minimum fill rate;

the combined spectral group includes a total number of connections and subconnections that are equal to or less than the maximum capacity for a single spectral group; and

combining spectral groups that satisfy the predetermined criteria.

7. The method of claim 4, wherein the spectral groups each include at least one connection and/or subconnection and wherein the spectral groups have a maximum capacity of connections and subconnections that can be carried in a single spectral group, and wherein combining spectral groups includes:

determining a minimum fill rate for a combined spectral group;

determining whether a first spectral group can be combined with a second spectral group according to predetermined criteria, wherein the criteria includes:

the first and second spectral groups overlap and the first spectral group extends beyond the second spectral group at a location other then an end of the second spectral group;

a fill rate of the combined spectral group is at least equal to the minimum fill rate;

the combined spectral group includes a total number of connections and subconnections that are equal to or less than the maximum capacity for a single spectral group; and

combining spectral groups that satisfy the predetermined criteria.

8. A method of organizing an optical network having a plurality of links, comprising:

defining a plurality of spectral groups, wherein each spectral group includes at least one link, and at least one spectral group includes a plurality of links;

assigning a plurality of signal channels to the at least one spectral group including a plurality of links, wherein at least one of the signal channels is assigned to less than all of the links in the spectral group.

9. The method of claim 8, wherein defining a plurality of spectral groups includes:

routing a plurality of signal channels from a source to a destination;

partitioning each of at least one signal channels into a plurality of subconnections; and

forming spectral groups for signal channels and subconnections that are routed on identical paths.

10. The method of claim 9, further comprising after forming a spectral group:

determining whether any of the spectral groups exceed a maximum capacity of the spectral groups;

converting spectral groups that exceed the maximum capacity of the spectral groups into two or more spectral groups that do not exceed the maximum capacity of the spectral groups.

11. The method of claim 10, further comprising after converting spectral groups:

determining whether the number of spectral groups exceeds a maximum number of available spectral groups;

combining spectral groups when the number of spectral groups exceeds the maximum number of available spectral groups, wherein combining includes adding the connections and/or subconnections from at least two spectral groups into a combined spectral group, so that the combined spectral group includes connections or subconnections that are not routed on identical paths.

12. An optical system comprising:
at least one sub-network including at least one spectral group router configurable to route a plurality of optical signal channels within a spectral group when contained within said sub-network, and terminate optical signal channels within a spectral group when bounding said sub-network, each optical signal channel being transmitted from one node within said sub-network to another node in said sub-network.

13. The system of claim 12, wherein the system includes a plurality of sub-networks.

14. The system of claim 13, wherein the spectral group router is selected from a group consisting of an OADM and an OXC.

15. The system of claim 14, wherein the sub-network includes a first source node including at least one transmitter transmitting information in at least one of said optical signal channels within the spectral group, and a first destination node including at least one receiver receiving said at least one optical signal channel within the spectral group, wherein the spectral group router routes the optical signal channel from the first source node to the first destination node.

16. The system of claim 15, wherein the sub-network includes a second source node including at least one transmitter transmitting information in at least one of said optical signal channels within the spectral group, and a second destination node including at least one receiver receiving said at least one optical signal channel within the spectral group, wherein the spectral group router routes the optical signal channel from the second source node to the second destination node.

17. The system of claim 15, wherein the sub-network includes a second source node including at least one transmitter transmitting information in at least one of said optical signal channels within the spectral group to at least one receiver in the first destination node, wherein the spectral group router routes the optical signal channel from the second source node to the first destination node.

18. The system of claim 15, wherein the sub-network includes a second destination node including at least one receiver receiving said at least one optical signal channel within the spectral group from the first source node, wherein the spectral group router routes the optical signal channel from the first source node to the second destination node.

19. The system of claim 15, wherein the spectral group router routes a plurality of optical signal channels having identical paths through the sub-network as a group.

20. The system of claim 15, wherein the spectral group router routes a plurality of optical signal channels having different paths through the sub-network as a group.